

CASE REPORTS

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Hepatic Artery Injury in Non-Penetrating Trauma

PETER TUXEN, MD
LUCIAN BUSCAGLIA, MD
Stockton, California

NOT OFTEN does blunt trauma cause injury to any visceral artery,¹ and isolated damage to the hepatic artery from blunt trauma is therefore a rarity. Such an injury occurred in the following case.

Report of a Case

A 16-year-old boy was involved in a single car crash and was not wearing a seat belt. On admission to hospital he did not appear acutely ill but he complained of pain in the right upper quadrant of the abdomen. Blood pressure was 110/60 mm of mercury and pulse rate 112. An abrasion over the left lower rib cage and tenderness in the central abdomen were the only physical findings. An x-ray film showed left-sided rib fractures, six through ten.

The hematocrit was 43 percent and leukocytes numbered 29,000 per cu mm. Paracentesis yielded bloody fluid. An upper midline incision was made in the abdomen and 500 ml of clotted blood was found in the peritoneal cavity. A hematoma was present in the region of the lesser sac and the hepatoduodenal ligament, and manipulation induced fresh arterial bleeding. The portal triad was carefully explored and a tear in the superior medial aspect of the proper hepatic artery was noted and repaired. The next morning a selective celiac artery arteriogram showed complete obstruction of the hepatic artery distal to the origin

of the gastroduodenal artery (Figure 1). At this time the blood pressure and pulse were within normal limits and the patient appeared generally well. Results of laboratory tests were within normal limits except for leukocytosis and elevated serum transaminase.

At re-operation, multiple patchy areas of infarction were evident in right and left lobes of the liver. Circumferential mobilization of the common hepatic and proper hepatic artery was carried out. A localized thrombosed segment was resected and the vessel was reconstructed by an interposition saphenous vein graft. The distal anastomosis was facilitated by placement of an inlying no. 10 silastic catheter and the junction was made with interrupted 6-0 cardiovascular suture.

Postoperative recovery was rapid and uncomplicated except for a few days of low grade fever. The patient was discharged home on the ninth postoperative day. Liver function tests showed return toward normal levels (Chart 1) and at four months after the operation the patient appeared entirely well. Arteriograms showed no improvement from the earlier intraoperative study (Figure 2).

Discussion

In a major review of the subject of hepatic trauma, Madding and Kennedy² found reports of 23 cases of common or branch hepatic artery injury following blunt trauma. Ligation was used in the management of complicated liver injuries. In a case comparable to the one reported here, Bushkin and coworkers recently described hepatic artery dissection from nonpenetrating trauma to the celiac axis.³

In the present case, a tear in the hepatic artery was recognized at emergency laparotomy, and an attempt at simple repair was unsuccessful. Cyanosis with patchy infarction was observed at re-operation, and reconstruction of the artery was again attempted and was again unsuccessful. Nevertheless, liver function improved and the patient did well. Had arteriography not been repeated the repair would have been assumed to have been successful.

From Department of Surgery, San Joaquin General Hospital, French Camp, California.

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Reprint requests to: L. Buscaglia, MD, 2420 N. California Street, Suite 21, Stockton, CA 95204.

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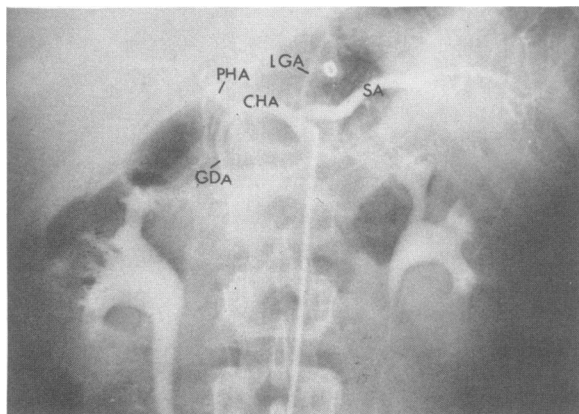


Figure 1.—Celiac arteriogram after the initial laparotomy. A metal clip overlies obstruction near point at which tear in hepatic artery was oversewn. Presumably, the repair compromised the vessel lumen, allowing thrombosis to occur. Retrograde filling of the hepatic artery distal to the obstruction indicates that collateral flow is already present. (SA=splenic artery; CHA=common hepatic artery; GDA=gastroduodenal artery; LGA=left gastric artery; PHA=proper hepatic artery.)

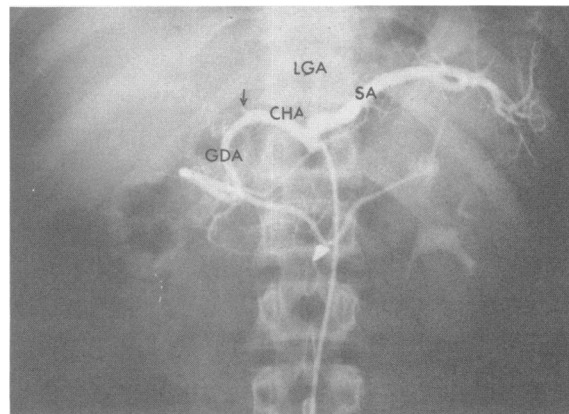


Figure 2.—Arteriogram six weeks after attempted saphenous vein interposition still showed no direct hepatic artery flow.

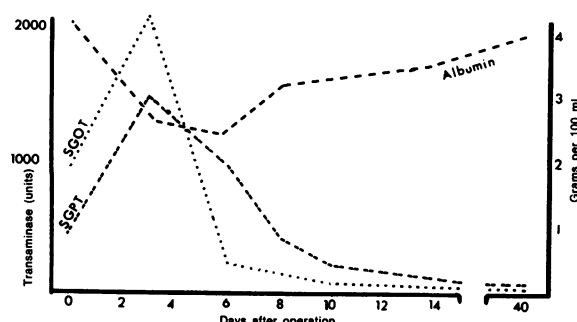


Chart 1.—Graph represents serial serum levels of glutamic oxalic and pyruvic transaminase after proper hepatic artery injury and permanent interruption. Bilirubin and alkaline phosphatase remained about normal at all times.

Such a favorable outcome is consistent with the current concept that hepatic artery ligation is well tolerated.^{2,4,5} Ligation has been performed, with satisfactory results, for arteriovenous fistula, malignant disease, cirrhosis with ascites, aneurysm and hemobilia. A normal liver can probably tolerate dearterialization, but there is a significant difference between common and proper hepatic artery ligation. The former produces no ischemic changes, presumably due to collateral flow via the gastroduodenal artery. On the other hand, proper hepatic artery ligation causes necrosis and temporary liver function impairment.² Because proper hepatic artery occlusion may represent a potentially fatal lesion, we believe repair is indicated. However, the liver's metabolic needs for survival and regeneration are met by increased extraction

of portal vein oxygen.⁶ The existence of small arterial collaterals to the liver is well documented,⁷ but most investigators believe this is a less important factor. Nevertheless, in the present case collateral flow around the site of proper hepatic artery ligation was shown in the early postoperative period. This may have accounted for the minimal morbidity and prompt recovery.

Postoperatively, maintenance of normal blood volume and the avoidance of hypoxemia are important to support a developing collateral circulation. Because of associated injuries, antibiotics may be necessary but would not be indicated for prophylaxis at the operative site alone, even in the face of hepatic infarction, since portal venous blood is sterile.

Summary

A previously unreported complication of blunt abdominal trauma, laceration of the proper hepatic artery, is reported. Because this may be a potentially fatal lesion, repair is indicated. Factors influencing survival relate to pre-morbid status of liver, preservation of splanchnic venous flow, and support of collateral circulation.

REFERENCES

1. Buscaglia LC, Lim R, Blaisdell FW: Penetrating abdominal vascular injuries. *Arch Surg* 99:764-769, Dec 1969
2. Madding GF, Kennedy PA: Hepatic artery ligation. *Surg Clin North Am* 52:719-728, Jun 1972
3. Bushkin FL, MacGregor MC, Hawkins IF, et al: Hepatic artery dissection as a result of abdominal trauma. *Surg Gynecol Obstet* 135:721-726, Nov 1972
4. Mays ET: Observation and management after hepatic artery ligation. *Surg Gynecol Obstet* 124:801-807, Apr 1967
5. Kim DK, Kinne DW, Fortner JG: Occlusion of the hepatic artery in man. *Surg Gynecol Obstet* 136:966-968, Jun 1973
6. Tygestrup N, Winkler K, Mellemegaard K, et al: Determination of hepatic artery blood flow and oxygen supply in man by clamping the hepatic artery during surgery. *Clin Invest* 41:447, 1962
7. Bengmark S, Rosengren K: Angiographic study of the collateral circulation to the liver after ligation of the hepatic artery in man. *Am Surg* 119:620-624, Jun 1970